

Application No. 10/613,115
Reply to Office Action mailed April 7, 2005

Attorney Docket: S-9-6

THE CLAIMS

The status of claims in the application is as follows:

CLAIMS:

1. (Currently amended) A method of treating an inter-vertebral disc, comprising:
 - a) contacting at least a first region of a nucleus pulposus of the inter-vertebral disc with at least one heat delivery element ~~[active-electrode]~~ of an electrosurgical system, the at least one heat delivery element ~~[active-electrode]~~ disposed on a shaft of an electrosurgical probe; and
 - b) applying a first high frequency voltage to said ~~[between the at least one]~~ heat delivery element ~~[active-electrode and at least one return-electrode,]~~ sufficient to decompress said disc such that pressure on a nerve root is reduced ~~[wherein at least a portion of the nucleus pulposus is effected]~~.
2. (Currently amended) The method of claim 1, further comprising:
 - c) contacting at least a second region of the nucleus pulposus of the inter-vertebral disc with the at least one heat delivery element ~~[active-electrode]~~, and thereafter, repeating said step b).
3. (Currently amended) The method of claim 1, wherein during said step b), the at least one heat delivery element ~~[active-electrode]~~ is translated within the nucleus pulposus, wherein a channel is formed within the nucleus pulposus, and translation of the at least one heat delivery element ~~[active-electrode]~~ within the nucleus pulposus is implemented via movement of the probe.

Application No. 10/613,115
Reply to Office Action mailed April 7, 2005

Attorney Docket: S-9-6

4. (Original) The method of claim 3, wherein movement of the probe is selected from the group consisting of axial movement, rotational movement, and concurrent axial and rotational movement.

5. (Currently amended) The method of claim 1, wherein said steps a) and b) result in formation of a channel within the nucleus pulposus, the channel having a channel wall, and the method further comprises:

d) positioning the at least one heat delivery element ~~[active electrode]~~ adjacent to the channel wall; and

e) coagulating tissue of the nucleus pulposus by applying a second high frequency voltage to said ~~[between the]~~ at least one heat delivery element ~~[active electrode and the at least one return electrode]~~.

6. (Original) The method of claim 5, wherein tissue at the channel wall is coagulated, and the nucleus pulposus undergoes a physical change selected from the group consisting of stiffening, increased rigidity, increased strength, decrease in volume, and decrease in mass.

7. (Previously presented) The method of claim 5, wherein the first high frequency voltage is in the range of from about 150 to about 700 volts rms, and the second high frequency voltage is in the range of from about 20 to about 150 volts rms.

8. (Original) The method of claim 5, wherein the first high frequency voltage is in the range of from about 150 to about 350 volts rms, and the second high frequency voltage is in the range of from about 20 to about 90 volts rms.

9. (Currently amended) The method of claim 1, wherein said the at least one heat delivery element is ~~[active electrode and the at least one return electrode are]~~ disposed on a distal end of

Application No. 10/613,115
Reply to Office Action mailed April 7, 2005

Attorney Docket: S-9-6

the shaft, and comprises a closed electrical circuit with said shaft ~~[and the at least one return electrode is spaced proximally from the at least one active electrode].~~

10. (Currently amended) The method of claim 1, further comprising the step of:

f) prior to said step b), providing an electrically conductive fluid at the at least a first region of the nucleus pulposus.

11. (Currently amended) The method of claim 10, wherein said step f) comprises applying the electrically conductive fluid to the heat delivery element ~~[at least one active electrode]~~, or applying the electrically conductive fluid to the disc.

12. (Currently amended) The method of claim 10, wherein the at least one heat delivery element is ~~[active electrode and the at least one return electrode are]~~ disposed on a distal end of the shaft, ~~[and the at least one return electrode is spaced proximally from the at least one active electrode,]~~ and the electrically conductive fluid provides an electrically conductive path between the at least one active heat delivery element and the disc ~~[electrode and the at least one return electrode].~~

13. (Original) The method of claim 1, wherein the shaft includes a shaft distal end, and the shaft distal end is introduced into the nucleus pulposus via an introducer needle, the introducer needle includes a lumen and a needle distal end, the shaft distal end includes at least one curve therein, and the shaft distal end is retractable into the lumen without contacting the needle distal end.

14. (Original) The method of claim 1, wherein the shaft is visualized fluoroscopically or endoscopically.

Application No. 10/613,115
Reply to Office Action mailed April 7, 2005

Attorney Docket: S-9-6

15. (Currently amended) The method of claim 1, wherein the at least one heat delivery element [~~active-electrode~~] comprises an electrode head having a substantially apical spike and a substantially equatorial cusp, and the shaft includes an insulating collar located proximal to the electrode head.

16. (Original) The method of claim 15, wherein the insulating collar comprises a material selected from the group consisting of: a ceramic, a glass, and a silicone.

17. (Currently amended) The method of claim 1, wherein the at least one heat delivery element [~~active-electrode~~] includes a filament; , and the shaft includes a first insulating sleeve encasing the filament, a return electrode on the first insulating sleeve, and a second insulating sleeve on the return electrode.

18. (Original) The method of claim 1, wherein the shaft includes a shield encasing the shaft, wherein the shield decreases the amount of leakage current passing from the electrosurgical probe.

19. (Original) The method of claim 1, wherein the shaft includes a first curve and a second curve proximal to the first curve, the first curve and the second curve are in the same plane relative to the longitudinal axis of the shaft, and the first curve and the second curve are in different directions relative to the longitudinal axis of the shaft, the first curve is characterized by a first angle and the second curve is characterized by a second angle, wherein the first angle is less than the second angle.

20. (Previously presented) The method of claim 1, wherein the volume of the nucleus pulposus is decreased and relieves pressure exerted by the nucleus pulposus on an annulus fibrosus.

Application No. 10/613,115
Reply to Office Action mailed April 7, 2005

Attorney Docket: S-9-6

21. (Previously presented) The method of claim 1, wherein the volume of the nucleus pulposus is decreased and decompresses at least one nerve or nerve root, and discogenic pain is alleviated.
22. (Currently amended) The method of claim 1, wherein during said step b), the at least one heat delivery element [~~active electrode~~] is axially translated within the nucleus pulposus to form a channel within the nucleus pulposus, wherein the channel is formed by a single straight pass of the shaft in the nucleus pulposus, and the channel has a volume in the range of from about 1 mm³ to about 2,500 mm³.
23. (Original) The method of claim 22, wherein the channel has a volume in the range of from about 10 mm³ to about 2,500 mm³.
24. (Original) The method of claim 22, wherein the channel has a diameter in the range of from about 0.5 mm to about 7.5 mm.
25. (Original) The method of claim 22, wherein the channel has a length in the range of from about 2 mm to about 50 mm.
26. (Currently amended) The method of claim 1, wherein during said step b), the at least one heat delivery element [~~active electrode~~] is axially translated within the nucleus pulposus and concurrently therewith the shaft is rotated about its longitudinal axis, wherein the at least one heat delivery element [~~active electrode~~] forms a channel within the nucleus pulposus, the channel is formed by a single rotational pass of the shaft, wherein the at least one heat delivery element [~~active electrode~~] is disposed on a distal end of the shaft, the shaft includes at least one curve, and the channel has a volume in the range of from about 2 mm³ to about 38,000 mm³.

Application No. 10/613,115
Reply to Office Action mailed April 7, 2005

Attorney Docket: S-9-6

27. (Original) The method of claim 26, wherein the channel has a volume in the range of from about 50 mm³ to about 10,000 mm³.

28. (Original) The method of claim 1, wherein the shaft has a length in the range of from about 4 cm to about 30 cm, and the shaft has a diameter in the range of from about 0.5 mm to about 2.5 mm.

29. (Original) The method of claim 1, wherein the shaft includes a shaft distal end, and wherein the shaft distal end is introduced into the nucleus pulposus via an introducer needle, the introducer needle including a lumen, wherein the introducer needle has a length in the range of from about 3 cm to about 25 cm, and the lumen has a diameter in the range of from about 0.5 mm to about 2.5 mm.

30. (Original) The method of claim 1, wherein the method is performed percutaneously, and the at least a portion of the nucleus pulposus is ablated at a temperature in the range of from about 45°C to about 90°C.

31. (Original) The method of claim 1, wherein the intervertebral disc is a lumbar disc, and the shaft has a length in the range of from about 10 cm to about 25 cm.

32. (Original) The method of claim 1, wherein the intervertebral disc is a cervical disc, and the shaft has a length in the range of from about 4 cm to about 15 cm.

33.-57. (Canceled)

58. (Previously presented) The method of claim 1, wherein said portion of the nucleus pulposus is removed.

Application No. 10/613,115
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Attorney Docket: S-9-6

59. (Previously presented) The method of claim 58, wherein said portion is ablated thereby reducing the volume of the nucleus pulposus.
60. (New) The method of claim 1, wherein the heat delivery element comprises an active electrode.